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by the advance of fitting arboreal vegetation, until a point was reached when the present climatic conditions were such as to limit any higher advance of the trees.

SEPTEMBER 21.

The President, Dr. RUSCHENBERGER, in the chair.

Twenty-eight persons present.

Bone Caves of Pennsylvania.—Prof. LEIDY remarked that in the early part of August, in company with Dr. T. C. Porter of Easton, he had visited Hartman's Cave, in the vicinity of Stroudsburg, Pa. They had been invited by Mr. T. Dunkin Paret, of that place, who had recently undertaken the exploration of the cave, and had obtained from it an interesting and important collection of animal remains, which had been submitted to Prof. Leidy's examination.

The cave is situated about five miles from Delaware Water Gap in a ridge which separates Cherry Valley from the valleys of the Pocono and McMichael's Creeks. The ridge is an anticlinal fold of the Helderberg or Upper Silurian limestone, and the cave, occupies the axis of the fold and opens in the face of a cliff formed by a cross section of the ridge. An accumulation of debris forms a slope at the base of the cliff, and above the debris and just below the arching roof of the cave, a low passage way has long been known into which adventurous boys would creep.

Mr. Paret commenced the exploration by having a passage dug through the debris to the entrance of the cave, and then extended the trench within the latter for upwards of a hundred feet, and to a depth sufficient to walk erect. At one place within the cave the digging was carried to the rock floor. It would thus appear that the cave is occupied by a bed of clay about 10 feet in depth. On this is a thin layer of stalagmite and on this again about a foot of black friable earth mingled with animal and vegetal remains.

No remains have been found imbedded in the clay nor on the rocky floor in the pit dug through the latter.

Prof. Leidy supposed that during the glacial period, a stream of water, from melting snow and ice at a higher level, had made a passage way through the fissured limestone of the anticlinal axis and had left in it the abundant clay deposit. When the cave ceased to be a water course the layer of stalagmite was formed and subsequently the more friable earth accumulated from materials, such as dust and leaves, blown in and mingled with the remains of animals, occupants of the cave, and of their food. The recess of the cave above the clay floor appears to have been too small to be inhabited by the larger carnivorous animals or man, and therefore no large entire bones of these have been found in the ossiferous stratum.

The remains thus far discovered are of such interest as to encourage Mr. Paret to continue further exploration Most of these collected to the present time were exhibited by Prof. Leidy, and consist of the following:

Numerous fragments and splinters of limb bones of smaller and large animals, many or most of which exhibit the marks of being gnawed, whether by rodents or small carnivores is somewhat uncertain. A few also show the marks of canine teeth, of medium sized carnivores. Some of the splinters pertain to such large and strong bones as to render it questionable whether they were produced by even our largest carnivores, and probably are the remnants of human feasts, in which the bones were crushed to obtain the marrow. Numerous bones and fragments of others of the smaller and smallest animals. These include especially limb bones, and lower jaws, and less frequently skulls, fragments of others and vertebræ. Many of these are also gnawed, while many are not.

The fragments of larger bones may be supposed to have been conveyed into the cave by small carnivores. A few pieces of bone are somewhat charred; and a small fragment of a lower jaw, containing a molar tooth, of the Bison, also apparently exhibits the marks of fire. This probably is a remnant from a human feast, which may have been carried into the cave by some small gleaner.

All the bones and fragments together amount to about half a bushel. Most of them pertain to animals of a kind still living, though some of these no longer belong to the fauna of our state, and a few of the remains are those of extinct animals. How far the remains of different species are cotemporary is uncertain, though it is most probable that they were introduced through a long succession of years from the time following the glacial period.

The remains of extinct animals consist of an incisor tooth and half a dozen molars of the great rodent *Castoroides ohioensis*, and portions of the upper and lower jaw, with teeth, of a young Peccary, the *Dicotyles nasutus*, previously known only from a single fragment of an upper jaw, discovered in Indiana, (Extinct Mammalia of North America, 385, pl. xxviii, figs. 1, 2. Jour. Acad. Nat. Sc., vii, 1869).

The remains of animals no longer living in Pennsylvania are as follows:

Bones and teeth of the Caribou or Woodland Reindeer, *Rangifer caribou.*

A fragment of the lower jaw containing the last molar tooth, of the Bison, *B. americanus.*

Many lower jaw halves, and other bones and teeth of the Wood-rat, *Neotoma floridana.* Most of these are of comparatively large size, and of the character of similar remains referred by Prof. Baird to a supposed extinct species, with the name of *Neotoma* *magister*, (U. S. P. R. R. Exp. & Surveys—Zoology. viii, 1857, 498).

Remains of other mammals are as follow: Lynx, *Felis canadensis;* Wolf, *Canis lupus;* Gray Fox, *Vulpes virginianus;* Skunk, *Mephitis mephitica;* Weasel, *Putorius ermineus;* Raccoon, *Procyon lotor;* Mole, *Scalops aquaticus;* Dusky Bat, *Vespertilio fuscus;* Little Brown Bat, *V. subulatus;* Woodchuck, *Arctomys monax;* Porcupine, *Erethizon dorsatus;* Beaver, *Castor fiber;* Muskrat, *Fiber zibethicus;* Gray Squirrel, *Sciurus carolinensis;* Ground Squirrel, *Tamias striatus;* Gray Rabbit, *Lepus sylvaticus;* Meadow Mouse, *Arvicola riparius;* White-footed Mouse, *Hesperomys leucopus;* Deer, *Cervus virginianus:* Elk, *Cervus canadensis.*

Among the remains, none have been identified as positively pertaining to our domestic animals, unless, perhaps, a pair of specimens are to be referred to this category. The specimens are the complete isolated first and second large molars of a fœtal or new-born Horse!

The collection further contains numerous bird bones, chiefly of the Wild Turkey, *Meleagris gallopavo;* some of turtles, the Box Turtle, *Cistudo clausa*, the Snapper, *Chelydra serpentina*, etc.; and others of several species of snakes.

In the same stratum were also found a number of shells of mollusks, chiefly *Helix albolabris*, *H. alternata*, and *H. tridentata.* Also a valve of *Unio complanatus.*

Of vegetal remains there were a few small fragments of charcoal, and many seeds, consisting of those of the Dogwood, *Cornus florida*, Pig-nut, *Carya porcina*, and Walnut, *Juglans nigra.*

The human remains are of an interesting character. One is a large stone celt of hard brown slate, obtained from the bone earth some distance within the cave. There are five bone awls, several of which exhibit marks of gnawing. Some of these were found in the cave, and others in the outside debris. An implement consists of the prong of an antler worked so as to be barbed on one side, and was probably used as a needle for making nets.

A small implement of bone, resembles in its present condition a crochet needle such as is now employed by ladies in making worsted work. It is much gnawed away on one side, and looks as if it may have been like an ordinary needle with a perforation, and this now rendered incomplete from the gnawing.

Another implement is a fish-hook worked out of bone.

Such bone implements are among the rarest of human relics in our portion of the country.

Another remarkable relic is a cone shell bored through the axis as a bead. The shell is a marine species, *Conus tornatus*, found on the western coast of Central America. Its presence among the cave remains, would indicate an extended intercourse among the inhabitants of early times.

The investigation of the interesting collection of remains secured by Mr. Paret, had led Prof. L. to examine a small collection of bones in the Museum of the Academy, which had been presented upwards of thirty years ago, as a sample of many of the same kind discovered in Durham Cave, Bucks Co., Pa. The cave appears to have since been obliterated in the quarrying of limestone. At the time of the presentation of the specimens of bones they were recognized as pertaining to existing species of animals and were therefore regarded as of little interest, though fortunately they have been preserved.

Prof. Leidy remarked that these bones were of the same character as those of Hartman's Cave, and he had distinguished among them the following:

The Black Bear, *Ursus americanus;* Raccoon, Skunk, Gray Fox, Deer, Moose, *Alce americanus;* Woodland Reindeer, Bison, Gray Squirrel, Rabbit, Beaver, Muskrat, Porcupine, Woodchuck, Woodrat, Wild Turkey, Box Tortoise, Snapper, Snake, Sturgeon, and Catfish.

The examination of these collections show that the exploration of small caves may not only prove of ethnographic value, but serve to give us information relative to the early fauna of the country. Thirty years ago Prof. Baird gave an account of the exploration of some bone caves in this State (Proc. Am. Assoc., II, 1849, 352). He refers to a vast accumulation of remains in one of the caves, and remarks that the number of species of mammalia found is twice that of present existing species in Pennsylvania. It is to be regretted that no further account has yet been given of the species to which the remains belong.

Dimorphic Flowers in Houstonia.—Mr. THOS. MEEHAN remarked that flowers dimorphic in their sexual character were well known. Generally there was little difference in the corolla between the short styled or long styled flowers, but in *Houstonia cœrulea*, *L.*, the long styled form was accompampanied by a thick tube, while the tube in the short styled form was not more than half the diameter of the other. In this species of *Houstonia* the anthers were placed on a ledge which was at the base of the tube in the long styled form. In the short styled form the anthers were brought to the mouth of the corolla without any lengthening of filaments, but by the bringing up of this ledge on which the anthers are placed. The position of the anthers at the mouth or at the base of the tube, was in fact decided by the modification of the form of the corolla tube. This had been explained in the first series of "Flowers and Ferns of the United States." In a recent examination of *Houstonia serpyllifolia*, Mx., on the top of Roan Mountain in North Carolina, Mr. Meehan found precisely the same characters in that species. On the same mountain *Houstonia purpurea*, *L.*, abounds, and also has a similar sexual dimorphism, but in this case the elevation of the anthers is due